

# Development and Application of 3D Printing Technology in Industrial Design

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**Abstract:** Internet technology promotes the transformation of social cooperation, and the rise of small organizations and distributed design behavior seem to be the inevitable trend. As a rapid prototyping process, 3D printing technology based on artificial intelligence technology will definitely bring revolutionary changes to the future manufacturing industry. This paper mainly analyzes the innovative application of 3D printing technology in industrial product design, explores the application of 3D printing technology in industrial design, lays a stable foundation and provides a strong driving force for the all-round and good development of China's industry, and hopes to improve the production quality of industrial products and provide corresponding reference. D printing technology is one of the technical paths to realize Industry 4.0.

**Keywords:** Artificial Intelligence; 3D Printing Technology; Industrial Design

## Introduction

With the continuous progress of technology, 3D printing technology is widely used. The development of product materials, the reduction of cost and the continuous advancement of sustainable development make it more frequently used. If the proposal of German Industry 4.0 opens the development curtain of future industrial design, then 3D printing technology will bring more new possibilities for future industrial design and will soon usher in the era of intelligent manufacturing<sup>[1]</sup>. We should face up to the enormous challenges brought by the Internet and information technology-digitalization has become the most important auxiliary design tool for industrial design.

## 1. Advantage Analysis and Application of 3D Printing Technology

At present, among the 3D printing devices introduced and independently developed in China, the printing materials are mainly ABS plastic or resin materials. ABS plastic is light and light, and can be flexibly disassembled and assembled in industrial design mold<sup>[2]</sup>. By combining with 3D software technology, it can not only carry out virtual simulation, but also carry out rapid physical simulation, especially for industries with high modeling requirements, which has a huge application prospect. For the modeling design with short consumption cycle and changeable container shape, volume and function, 3D printing technology can be used for rapid prototyping in the process of design and production, especially for the generation of irregular surfaces of complex curves and fine packaging parts.

The virtual model of the container is made in the computer by using 3D software technology. The section data of the 3D virtual model is scanned by 3D printing equipment, and the printing material suitable for the model forming is selected to quickly print the real object for simulation. For different container shapes and parts, the final design scheme and realistic renderings can be obtained after repeated revisions, and the printed physical model can be produced in large or small batches. This production method using 3D printing technology can quickly generate experimental models in small batches, reduce investment risks, speed up the sound field, test and feedback cycle of products, and bring products into the market faster and generate economic benefits.

## 2. D Printing Technology and Industrial Design

In the era of Industry 4.0, in order to occupy the commanding heights of the fourth industrial revolution, the comprehensive application of emerging technologies is essential. Nowadays, people love smart products, and our life has been changed by intelligent systems such as cloud industry, Internet of Things and big data network<sup>[3]</sup>. With the improvement of people's living standards, consumers have higher requirements for industrial products. With the development of new technology, designers need to design products that are more in line with consumer satisfaction according to consumer demand. With the help of mature software technology, industrial design has shown unparalleled advantages in terms of product expressiveness, modeling authenticity and visual effects. We can see from this that the development of new technology provides technical support for the development of modern industrial product design, and also urges digital media technology to continuously meet the needs of product design.

## 3. D Printing Technology and Industrial Design

In 2015, SOLS made a good demonstration on how to design service for 3D printing orthopedic insole industry. SOLS uses 3D

printing technology to produce orthopedic insoles for patients of physiotherapists, podiatrists and orthopedic doctors. Firstly, a series of foot photos are collected, and a 3D printed model is generated, so as to tailor the insole suitable for users.

The core of SOLS business is to build an excellent orthopedic insole service system, combining service design thinking with the possibility of 3D printing: download SOLS APP to enter the customized system. A new user document needs to be created in this system; APP guides the user to measure the foot length, and obtains the length and width of the user's feet, life style and the hardness of the insole needed; APP will enter the stage of collecting user's feet image data, and provide data for the subsequent process of reverse digital modeling<sup>[4]</sup>. After completing the data collection of the first three steps, the system has completed the modeling of the insole in real time. At this time, the operator can adjust the key data such as the curvature of the arch, the length and material of the insole, and finally prescribe the orthopedic insole. The application gives some humanistic care to the soft needs of users' life styles, and greatly improves users' satisfaction.

#### **4. Case analysis of orthopedic insole service design——Taking 3D printing as an example**

With the gradual popularization of 3D scanning and 3D printing technology in the medical field, some brace studios and orthosis centers at home and abroad have introduced a new 3D digital brace customization process and benefited from it. For patients, they no longer need to be plastered with a thick plaster bandage, but only need to receive a non-contact 3D scan, and the digital “mold taking” can be completed in 2 to 3 minutes, thus avoiding the pain of the affected part and being more clean and sanitary. For doctors and orthopedic technicians, the digital customization process of braces reduces the complexity of the procedure to the greatest extent, improves the customization efficiency of braces, and can provide patients with compliant braces with better matching degree and obtain better customer satisfaction.

#### **5. Conclusion**

Today, when the word “intelligence” has been generalized, we can neither turn a blind eye to the ethical risks in intelligent products and human factors, nor ignore the important role of extraction and analysis technology of human factors data in intelligent products and intelligent design. Whether it is industrial design or artificial intelligence, its ultimate goal is to seek the well-being of all mankind and improve people's comfort and quality of life. The industrial design led by the intelligent era in the future will make the agent and people's life behavior and environment more naturally integrate by means of design. If we say that industrial design endows products with formal beauty and aesthetic integrity, then artificial intelligence adds more intelligence and imagination to products, and the two depend on each other. The beauty of technology lies in making complexity simple, humanization and temperature. 3D digital technology is not an end in itself, but an innovation to improve human production and life.

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